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AN IMPROVED APPLIANCE IN THE PHYSIOLOGICAL TREATMENT OF CLEFT PALATE.

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[Read before the Massachusetts Dental Society, December 13, 1883.]

It has usually been said that lesions of the palate arise from one of two causes, that is, they are either congenital or accidental.

Congenital cleft of the palate was as commonly treated surgically as by mechanism. The former treatment has been nearly or quite abandoned in recent years for two very good reasons: First, it is a very painful one for the patient, and difficult for the operator, and a failure of closure is largely in the majority. Second, it universally fails to improve the speech even after a successful closure.

Notwithstanding the above facts, some physicians recommend staphyloraphy. They must certainly do so from a want of knowledge of the anatomy and physiology of the vocal organs and their use in the mechanism of speech, which is the production of sound, and its direction through the nasal passage or the mouth at will, being controlled by certain organs whose modification and resonance enable us to form what we term articulate speech.

One of the most important aids in producing the above results is the soft palate. This organ is lifted up and comes in close contact with the pharyngeal wall, thus shutting off the nasal passage, which is absolutely essential in producing all excepting nasal sounds. After the operation of staphyloraphy such a closure is impossible, owing to the soft palate having been made too short and tense; hence defective speech invariably follows.

Accidental lesions of the palate, as the name suggests, are caused either by accident or disease. These cases may be successfully treated with a very simple appliance, while the same amount of skill exercised on a congenital cleft would have no beneficial result. This may be accounted for by the fact that in the former case the patient had learned to articulate distinctly, and use the organs of speech efficiently and correctly, while persons who are thus deformed from birth are obliged to learn the art and methods of articulation by slow and painful processes. The organs require the training which is necessary for one who acquires a new language. Hence the appliance for relief should not only fill up the gap in the defective palate, but should also be so constructed as to work on physiological principles in harmony with the natural movements; that is to say, it should be under perfect control of the surrounding muscles. It is manifest, therefore, that the success, even of the most scientifically adjusted instrument, depends largely upon the coöperation of the patient who uses it.

As the above malformations are classed as congenital, and accidental, the appliances for their relief are classed as follows: obturators and artificial vela. Among the former Dr. William Suersen is the inventor of one which has created much interest. The most important and significant advance in this department of science, however, made itself manifest in attempts to form an artificial velum, and Dr. Stearns was probably the first to introduce its true principle. I speak of these two investigators, Suersen and Stearns, because I am led to think that they have brought before the profession the most scientific apparatus of each class, and it is from a consideration of both of their appliances that I have evolved the principle, in explanation of which this paper has been prepared.

Suersen says: "In order to be able to pronounce all letters distinctly it is accordingly necessary to separate the cavity of the mouth from the cavity of the nose by means of muscular motion. That separation is, under normal conditions, effected, on the one hand, by

the velum palati, which strains itself (consequently by the levator and tensor palati), but, on the other hand, also by a muscle, which to my knowledge has not yet received a sufficient amount of attention in connection with these operations. I mean the constrictor pharyngeus superior. This muscle contracts itself during the utterance of every letter pronounced without a nasal sound just as the levator palati does. The constrictor muscle contracts the cavum pharyngo-palatum, the pharyngeal wall bulging out, and it is chiefly on the action of this muscle that I base the system of my artificial palates."

It will be noticed that Suersen admits that the levator palati is an important organ of speech, yet he makes no provision for utilizing it as such, and only provides for the superior constrictor muscle coming in contact with the distal surface of his appliance to shut off the nasal passage. In my opinion, for the patient afflicted with congenital cleft to acquire perfect articulation with such an appliance (even if it be possible), years of application and training of this muscle would be necessary. A little reflection will show that this muscle, besides performing its own function, must be trained to fulfill those of the velum palati, levator palati, and tensor palati. But in an *accidental* lesion this may be all that is necessary, as the patient having previously learned to articulate distinctly, and having this deformity come upon him afterwards, the superior constrictor muscle would, no doubt, be sufficiently developed to perform that function.

Sir William Fergusson, in his report of a dissection made by him of a cleft palate in 1844, states distinctly that the superior constrictor was very full, and he also claimed for that muscle very decided forward action in deglutition. It was in the year 1841 and 1842 that Dr. Stearns made his first artificial velum. In 1860 Dr. N. W. Kingsley came into the field, and took up Dr. Stearns' appliance. Finding it too complicated for the general practitioner to construct, and too expensive when completed for those in ordinary circumstances, he was led to serious thought in regard to modifying its production, but still adhered to the same principle of utilizing the levator muscle.

Dr. Kinsgley says respecting Dr. Stearns' appliance: "Two principles were vital to Dr. Stearns' instrument, namely, first, the artificial velum should embrace the levator muscles of the palate, so that it could be lifted by them; and, second, that it should bridge the upper pharynx behind the uvula, and cut off nasal communication at will."

Dr. Kingsley's modification of Stearns' instrument consisted chiefly

in leaving off the triple form, and doing away with the central slit, the flap and the springs. The simplified form consisted of two leaves of soft vulcanized rubber, connected in the median line, the palatal portion running down to the uvula, and then bridging across at that point, and the nasal portion reaching across the pharynx. Instead of the appliance being made in sections so as to slide across each other, as in the Stearns, the bifurcated uvula slides between the two leaves, and the levator muscles of the palate lift it up to meet the pharynx, thus shutting off the nasal passage. It will be noticed that in this simplified form the Stearns principles are fully carried out, and to Dr. Kingsley that credit is due. His claims to originality are in the simplifying of the Stearns instrument.

Dr. Kingsley says: "An important principle enunciated by Dr. Stearns as essential to the success of all artificial vela for congenital cleft was that the instrument filling the fissure in the natural palate must be of the nature of a valve under the control of the muscles surrounding it, and so arranged that it could be elevated by them, thus shutting off the nasal passage, as is absolutely essential in the production of certain sounds belonging to articulate language. This principle was carried out by him first in the character of the material chosen, being of a yielding, elastic nature, and second in the form, being made to embrace the levator muscles, and subject to their control."

Dr. Kingsley in speaking of Dr. Suersen's appliance, says: "First, that of all obturators this is the best form for a congenital fissure, but while the wearer is enabled to articulate with such an instrument it is only after he has learned articulation with another apparatus. Second, that a soft, elastic, artificial velum is much better adapted to the acquirement of articulation than any unyielding, non-elastic substance, but when acquired an obturator may be substituted. Third, that in very rare cases articulation may be acquired with an obturator only, but it is the result of the extra activity of the pharyngeal muscles, while with the elastic velum the levators of the palate contribute largely."

A great many practitioners in treating a fissured palate simply separate the nasal and buccal cavities by a thin plate, thinking that the separation is all that is required. Some even make a great parade of this device, claiming it to be an improvement over any other appliance. A little reflection will show this to be impossible, as I shall endeavor to explain before closing this paper.

My own experience with soft vulcanized rubber for an artificial velum is that if it would resist the fluids of the mouth, and not go through a process of decay, and change its form, in short, if it could be made permanent, it would be all that could be desired. Since this is impossible, I do not hesitate to say that it is a very objectionable material, and I have been led to long and careful meditation regarding it.

I experimented for five years to provide an artificial appliance with hard rubber, carrying out the Stearns principle, whereby I could utilize the levator muscles to control the movement of the appliance, and with which articulation could be learned as well as with the soft rubber. My studies and experience induced me to settle upon the following device, which consists of a gold or hard rubber plate (A. Fig. 1), covering the roof of the mouth down to the junction of the hard and soft palates. From this point the artificial velum, F, extends back and downward, restoring the symmetry of the palatal surface by bridging across and lying upon the muscles of each side. The distal surface, G, or that portion coming in contact with the pharyngeal wall, is quite broad, and so constructed as to articulate perfectly with this surface, while the constrictor muscle contracts and closes around it on a semicircle. This is the Suersen principle, and the main idea I take from that appliance.

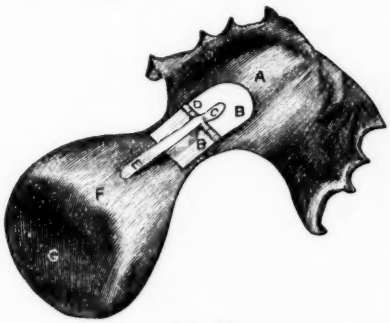

Fig. 1.*

The velum is of polished hard rubber, gold or platinum, and much resembles a chestnut in form.

It is attached to the plate with a hinge joint, B, B, thus giving free movement at the junction of the hard and soft palate. At the junction of the hard and soft palates there is a stop, which prevents any downward pressure upon the muscles when in a relaxed condition.

The bulb-like form of the velum (see D, Fig. 4) necessitated a thickness which would naturally have made it quite heavy, and as the resultant weight would be a serious objection, I was desirous of over-

*The accompanying cuts are kindly loaned by Dr. J. W. White, the editor of the Dental Cosmos.

coming the difficulty. A suggestion happily came to my relief in this way: While in a drug store I accidentally took up a hard rubber truss made by a Philadelphia firm. Discovering that the pad was hollow, I thereupon wrote to the manufacturers, asking them if they would inform me how they prepared the rubber in that way. In their reply I found that the method was quite simple. It is as follows: Take the vulcanite rubber in the soft state and cut the sheets so that when joined together the desired form is given. Then a little water is dropped into the cavity (I found it better to add a little alcohol), the edges are sealed, and the piece vulcanized in the usual way. The steam produced by the water and alcohol inside creates sufficient pressure to keep the walls distended. By this method the appliance that the cuts were taken from which illustrate this article was made so light that it would not sink when put in water.

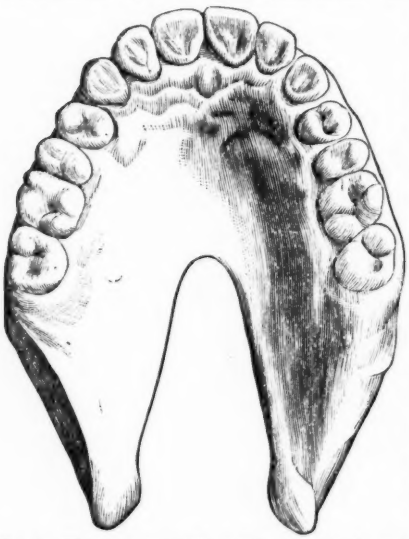

FIG. 2. The cleft, extending a little beyond the soft into the hard palate.

In treating a case by Kingsley's method I was obliged to use a hinge joint to bridge over a union by staphyloraphy. I found in that case that the appliance was much better controlled by the surrounding muscles, and saw a much more rapid progress in acquiring articulate speech. This led me to more fully provide for that muscular movement, and I will endeavor to give the reasons why this should be done. As we have before quoted from Suersen, in order to pronounce all letters distinctly it is necessary to separate the cavity of the mouth from that of the nose by muscular action, and to close the nasal passage in pronouncing every letter, except *m* and *n*. This can be demonstrated by holding the nose while endeavoring to pronounce all the letters as plainly as possible.

In studying the mechanism of speech we learn that more than

three-fourths of the sounds of articulate language depend upon the integrity of the soft palate for their perfect enunciation. This being the fact, articulation with a rigid obturator must be extremely difficult to acquire. If three-fourths of the sounds depend upon the free movement of the natural palate, it seems to me a sufficient reason why we should provide for that movement in an artificial one.

Dr. Kingsley says that with a yielding appliance the levators of the palate contribute largely to correct speech. The surrounding muscles have control over my appliance in the following way: The artificial velum bridges across the opening and lies upon the muscles of either side. (See Fig. 3, D, D.) With all sounds requiring the closure of the nasal passage it is thrown up (D, Fig. 4) by the levator muscles, there being no resistance. The thickness of the velum brings its posterior surface in close apposition with the superior constrictor muscle, F, and thereby affords, in the pronunciation of the gutturals, a firmer resistance to the pressure of the tongue, G, than can be obtained with a thin obturator. By the presence of the hinge, B, the above movements are rendered so free and easy that there is no tendency to any displacement of the plate, such as occurs with a rigid appliance. If a nasal sound immediately follows a guttural, the descent of the velum is rendered certain by its own weight. (Fig. 5, D.) My first instruments show a spring bridging over the hinge, by which I intended to accelerate the movements of the velum. This I found later to be unnecessary.

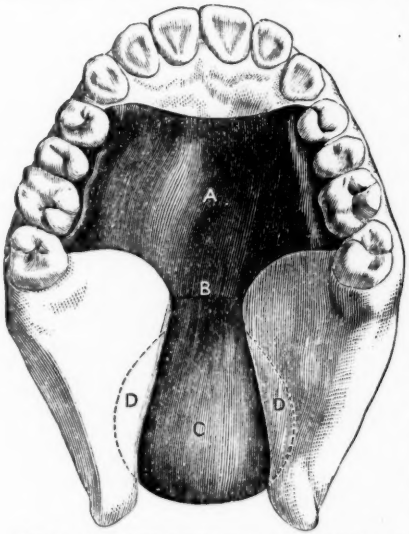

FIG. 3. Appliance in position: A, the plate; B, the stop, preventing any downward pressure when the muscles are in a relaxed condition; C, the artificial velum; D, D, muscle lying under it, the dotted lines showing the appliance resting on the muscles.

To accomplish the above with a material that would be permanent was a problem very difficult of solution. Of course it is impossible to give to a piece of mechanism muscular power, but it should be made

so easily movable as to be acted upon by, and be under perfect control of, the muscles surrounding it.

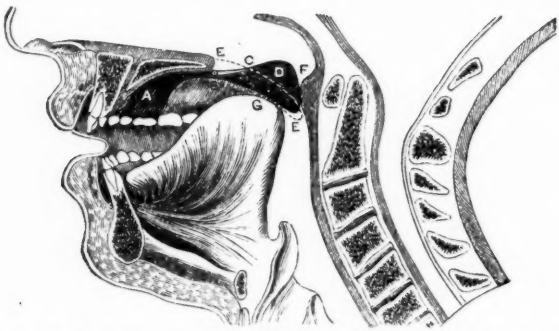

FIG. 4. The artificial palate thrown up by the muscles, E, E, as in all sounds requiring the closure of the nasal passage; F, the superior constrictor muscle, advanced to meet it; G, the tongue, raised, pressing hard against the appliance, as in pronouncing the letter k or g; A, the plate; B, the hinge joint and stop.

I claim the following advantages for my appliance:

First. That it is made of a permanent material.

Second. That articulation can be learned with it more readily than with any other appliance.

Third. That it is much easier to make.

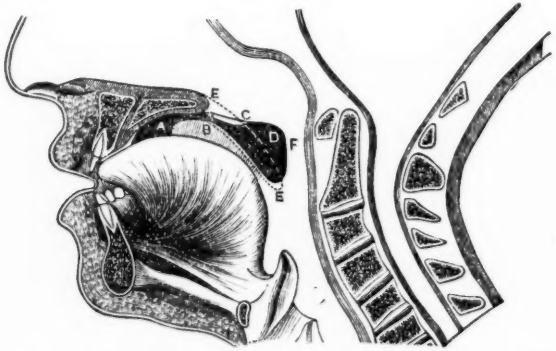

FIG. 5. The muscles relaxed, the appliance descended, thus giving a free passage for nasal sounds and respiration.

Thus the unsatisfactory operation of the surgeon has been replaced by artificial organs of precision, working upon physiological principles. The ingenious appliances of our distinguished colleagues, Suersen, Stearns, and Kingsley, whose scientific attainments and

researches have reflected such luster upon the art of dental prosthesis, have excited my admiration as I have studied their complex operations; and if I have been enabled to extend their usefulness, and increase their value by substituting an imperishable material for the less excellent substances now in general use, I shall consider that the years of study I have given to this remote and rarely considered problem of science have not been altogether without their reward.

PERMANGANATE OF POTASH.

BY CHAS. MAYR, A. M.

[Read before the Conn. Valley Dental Society, at Savin Rock, June 19, 1884.]

The subject hardly seems sufficient to read a paper about; but as the substance appears to me to be a typical representative of a principle, I thought it best to make a few experiments about it, and to see what it did and how it came up to what is claimed for it. You all are familiar with the differences between fermentation, putrefaction, disinfectants, antiseptics and deodorizers; but, to be understood more clearly, I shall take the liberty to tell you what I mean by these terms. Every one has a special definition of his own.

I consider as a *disinfectant* a substance which by purely chemical reactions destroys an offensive substance.

An *antiseptic* is a substance which prevents the formation of sepsis and, as a consequence, of septic organisms and products.

A *deodorizer* is a substance which destroys the unpleasant odors alone. Let us see what such a deodorizer practically amounts to. To understand its action we must know what an odor is; perhaps not every one among you has realized that an odor is nothing in itself, and that an odor is nothing but the impression which the vapors of a certain substance produce upon the extremities of our olfactory nerves. The odors of a substance cannot be separated from the substance. When we smell a violet we do not smell the violet at all, but the vapors of a small amount of essential oil secreted by the glands of the violet. When we smell sulphuretted hydrogen we cannot separate the odor of the sulphuretted hydrogen from the sulphuretted hydrogen any more than we can separate the looks of a person from the person. The odor is simply one kind of impression which external objects make upon our senses. No substance has any odor which is not volatile, that is, which cannot be transformed into vapor.

Sulphuric acid, a very powerful agent, has no odor at ordinary temperature; but if you heat it you will begin to perceive a faint odor at about 180°, which becomes more and more powerful as the vapor becomes dense.

This also explains why we cannot smell through glass. Kakodyl, probably the most offensive substance produced, is perfectly odorless when sealed up in a glass tube.

The deodorizer, as such, is therefore a chemical which must destroy the vapors of the substance. In most cases such a thing is not possible without destroying the substance of the thing itself. In other cases, we may cover the odor of a substance by that of another, less unpleasant to our senses, similar as we cover tastes. The organ of taste is very different. Gaseous substances seem to have no effect upon it, but only substances soluble in water.

We have, therefore, so to speak, three senses corresponding to the three states in which matter may appear: The sense of feeling for solids mostly, or mechanical action; the sense of taste for liquids and solubles, and the sense of smell for volatile substances.

Most deodorizers are powerful smelling substances, like musk, essential oils, etc.; but they cannot properly be called deodorizers; because the odors exist and remain, we only cover one kind by another odor.

A disinfectant must act chemically. If we take a solution of sulphuretted hydrogen, to most people the solution smells offensive; but chemists get so used to it that, sincerely spoken, it does n't make to me any difference to smell sulphuretted hydrogen or roses. The unpleasantness is only at the beginning. If we destroy the sulphuretted hydrogen or other volatile smelling substances—be they now generated by putrid eggs or putrid meat, or other decaying substances—we disinfect the substances; anything which will destroy these substances is a disinfectant.

As a very handy and effective means to destroy not only the sulphuretted hydrogen but the ammonia, the ammonium sulphide, the fatty ammoniates, the amines like trimethylamine, dentists have used *permanganate of potash*. If we take any ore of manganese, like pyrolusite, and heat it with chlorate of potash and caustic potash, we obtain a green mass. This green mass is manganate of potash, K_2MnO_4—the oxygen in this case being derived from chlorate of potash, $KClO_3$, somewhat after this reaction:

$$KClO_3+MnO_2+(KaOH)_2=KCl+K_2MnO_4+H_2O+2O$$

If we boil this manganate of potash, the green color will turn violet, and a brown precipitate will become noticeable. The solution contains now pure permanganate of potash. The precipitate is a hydrated oxide of manganese. If we allow it to settle and pour off the red solution and evaporate it, we obtain the well known dark red crystals of permanganate of potash. This substance may be considered as a convenient means of carrying red-hot oxygen to any available point. One atom of oxygen in this permanganate of potash seems to be combined in an ozone-like manner, and a solution of permanganate of potash has indeed a faint odor of ozone. This odor becomes strongly perceptible if we add sulphuric acid to the permanganate. Ozone is, for practical purposes, nothing but red-hot oxygen and, as such, it will combine with all the available carbon, and hydrogen, and carbon-compounds, forming water and carbonic acid After this oxygen has combined, a perfect inert brown residue is left —a hydrated oxide of manganese.

As some writers use the terms antiseptics and disinfectants indiscriminately, I thought that perhaps this manganese of potash might best illustrate the difference. A substance which may be called a real antiseptic must not lose its power the moment it acts as a disinfectant, and if, after the substance has acted, a new production of offensive vapors takes place, the substance cannot be called an antiseptic. With this view in mind, I determined to settle the difference. I prepared solutions of different kinds; beer, bread and saliva; beer, meat and saliva; beer, yeast and saliva, etc. I waited till they had all got into that agreeable stage where sulphuretted hydrogen appears like perfumery compared with them, and then I applied different substances. I do not think that it is material to mention exact figure-statistics. I have them on my record book and, if needed, can bring them up; but I will only state the facts. One of the putrid solutions which reacted very sour, because of the prevalence of fermentation over putrefaction, I treated with a five per cent. solution of permanganate of potash; every odor disappeared; a heavy brown precipitate appeared and the liquid on the top of it, slightly yellowish, showed a most astonishing transparency. Every small organism had disappeared. The oxygen had burnt up everything. I allowed this pure disinfected substance to stand a week longer, and, as I had supposed, no antiseptic effect of the permanganate showed itself; after one week, not only did the fluid swarm anew with new organisms produced from new infection, but even the heavy precipitate of oxide

of manganese was all dissolved, and the "germs" were all powerful. Another of these septic solutions I treated with equal volumes of a concentrated solution of white arsenic;—not the slightest effect was perceptible. Another one, with equal volumes of a solution containing two per cent. of acetate of lead. The offensive odor disappeared, only a slight sour odor remained; but no new infection took place, although the solution was exposed in the same manner as the other. A fourth solution I treated with equal volumes of a one per cent. of bichloride of mercury solution; there remained a strong odor, a heavy precipitate of calomel was formed; but, to my astonishment, after about two weeks, a small scum had formed on the surface of the solution and, examined under high power (1,800 diameters, Tolles' immersion lens), small rows of a form resembling that of the ferment of lactic acid, yet very much smaller than usually seen, were perceptible. This fact stands somewhat isolated, and I was surprised because the solution contained mercury not only in the shape of calomel, which is not absolutely insoluble, but also in some dissolved form. From these experiments it may be seen clearly that none of the substances was as perfect a disinfectant as permanganate of potash, but almost every one of them was a better antiseptic than the substance.

Some little detail of interest might be described about these experiments, but dentists, as a class, have to deal with those complex fluids surrounding the teeth, and to be of practical use for them, experiments have to be made with liquids similar to these. In connection with these experiments I would like to say something about sublimate. I am astonished at the recklessness with which, to my conception, sublimate of mercury is used by some practitioners. If this sublimate of mercury has a debilitating effect upon lower organisms, it certainly has also the same upon the big, lower organism—man; and a continuous treatment to even a 1:1,000 solution of sublimate will prove very active in producing a debilitated race.

It is true, in syphilis it might be extremely useful, but we do not want to treat every person for syphilis. For occasional application I do not doubt that mercury is quite effective; but a chronic treatment with it appears to me as if smacking a trifle of old Molière's doctors.

Have any of the gentlemen tried lead preparation for the treatment of lesions about the teeth? They are certainly very effective and much more kindly borne by the tissues than the mercury solutions.

They seem to me to deserve more attention. The acetate of lead and the basic acetate of lead would both be good preparations for dental purposes.

I do not care to give long arrays of figures, or lengthy deductions. I find that the discussion is usually far more profitable than a lengthy paper.

THE SEPTIC THEORY OF DENTAL CARIES.

BY F. SEARLE, D. D. S. SPRINGFIELD, MASS.

[Continued from page 243.]

It is not quite evident why Underwood and Milles gave the name, "septic theory," to their explanation of caries—a disease dependent upon the presence of organisms—rather than the more appropriate term, "germ theory," originally given by Pasteur, to explain the same class of diseases. Having proved that the organisms were derived from germs, Pasteur gave the name, "germ theory," to distinguish it from other theories of septic diseases then in vogue. If the septic theory, as applied to dental caries, has any significance, it is identical with that of "germ theory," which certainly is more appropriate. Besides, there are already in medical use a sufficient number of different terms, meaning one and the same thing. It is desirable, therefore, for the sake of the illustrious man who gave the name, as well as for appropriateness and uniformity, to retain the use of the term, "germ theory."

In looking for data upon which to show the effects produced by bacteria in or upon the tissues in which they are found, we cannot do otherwise than to refer to papers and text-books which are regarded as authority in this department of knowledge. I shall not introduce the question of the different genera and species of bacteria, as this would open too large a field, and would not be pertinent to my purpose. We have to deal now only with the micro-organisms, called pathogenous bacteria.

Zeigler, in his text-book on Pathological Anatomy, says: "It has long been known that certain diseases arise in consequence of the settlement of certain plants and animals in the human organism. Only of late years have we learned that the domain of these parasitic disorders are of wide and far-reaching extent." "Some of these parasites or bacteria find their appropriate soil in the perfectly healthy tissues, in which they grow and multiply; others can only develop in

tissues morbidly changed so as to correspond to their requirements. All that is necessary is that a bacterium should reach a spot that affords the conditions for its development. In this it multiplies and forms colonies, which live at the expense of the tissue invaded. Sooner or later these local settlements bring about degeneration and necrosis of the affected tissue depending upon the nature of the bacteria and of the tissue."

"In the first place, the bacteria, as they grow and multiply, withdraw from the nutrient fluid of the tissues the elements they require for building up their own cells. These elements are chiefly nitrogen, carbon, hydrogen and oxygen, and also the inorganic components of sulphur, phosphorous, magnesium and potassium." "In the next place, they set up marked chemical changes in the nutrient fluid. It is bacteria which superinduce putrid decomposition in albuminoid bodies; they transform sugar into lactic acid; lactic acid into butyric acid; and alcohol into acetic acid. When albuminoids undergo putrid decomposition we have formed peptones and similar bodies: a certain principle or poison; and bodies resembling ferments."

"Pasteur, Lister and others speak of the decomposition as the direct result of the growth of bacteria. Decomposition and fungus are inseparable; the one ceases when the other is removed. Processes of this nature, set up by bacteria, are best distinguished as fermentation. Considered with respect to their property of setting up fermentation, bacteria are often described as organized ferments. Bacteria have also the power of setting free certain substances which have a decomposing action like themselves, and are known as unorganized ferments."

"Pasteur regards fermentation as immediately dependent on the activity of the organisms. Fermentation begins only when the supply of free oxygen to the bacteria is restricted. They then begin to abstract oxygen from the compounds contained in the tissues or nutrient fluid, and so disturb their equilibrium."

"Fermentation and putrefaction can only take place in presence of the corresponding fungi, and the amount of decomposition produced depends on the quantity of the fungi present. It does not, however, follow that each kind of decomposition is due to a single specific fungus, nor that one fungus may not give rise to more than one kind of decomposition. In most putrefying substances we find bacteria of several species."

"In general terms, we may say that local settlements of bacteria will

sooner or later bring about degeneration and necrosis of the affected tissue. When this may occur, and how widely it may spread, are circumstances depending on the nature of the bacteria and of the tissue."

"Each kind of bacteria has a corresponding special group of tissues in which its mischievous effects are invariably and especially apparent. If they reach the blood, through the lymphatics, or directly, they are carried by it to remote parts. Many of them perish in the blood, others again increase and multiply. Once in the body, they multiply in the blood or in some tissue spread through the system, and call forth the special changes characterizing the several diseases." He might have added: Once in the teeth, the bacteria advance from enamel to dentine, from dentine to pulp, from pulp to perios, and to the soft tissues of the bone, sometimes causing extensive necrosis and, in rare instances, pyæmia.

In this connection, i. e., to show the agency of bacteria in producing disease, I will add only the following from Tyndall. Speaking of the relation of living organisms, he says: "Living ferments, finding lodgment in the body, increase there and multiply directly ruining the tissue on which they subsist." Again, he says: "For in that common ferment there seems now to be identified a force which, acting on organic matter, whether dead or living, can on the one hand initiate putrefaction in what is dead, and on the other hand initiate inflammatory processes in what is living."

Enough has been quoted from the writings of the world's best scientists to show the action of pathogenic bacteria on soft tissues. The question next to be determined is, do soft tissues exist in the teeth?

The knowledge of the minute anatomy and physiology of the teeth has been a matter of slow development, dependent upon the improvements of the microscope and the methods of preparing specimens; also of the training of the eye to make correct observations. Up to the time of the opening of Prof. Heitzmann's school in New York, and the more thorough study of the histology of the teeth by Dr. Bödecker and many others, the teachings prevailed that "the dentine is a homogeneous calcarious matrix in which no trace of cellular or other structure can be detected, permeated by minute tubes radiating from the pulp-cavity, which are occupied by fibrils proceeding from the pulp and endowing the tissue with sensibility. The tubes being so minute that their actual structure cannot be

determined, but they undoubtedly are the sole protoplasmic constituents of dentine. The organic basis is contained in the inner walls of the tubes surrounding the fibrils. No cellular or protoplasmic elements are discoverable in this fibrous structure; the vessels of the pulp are not in intimate contact with dentine; the dentine and enamel are incapable of anything like pathological action," etc.

Dr. Miller says, in a paper just published in the *Dental Record*, that in the teeth the lime-salts form a definite chemical combination much more insoluble than the lime-salts themselves; that this combination is the result of the vital force in the tooth itself. Dr. Miller gives no authority for this statement. These teachings are directly at variance with the observations made by Prof. Heitzmann, Dr. Bödecker, Dr. Abbott, and many others in the New York School of Microscopy. The teachings of that school are embodied in a work by Prof. Heitzmann, "Microscopic Morphology," published in 1883. Neither Underwood and Milles nor Dr. Miller seem to have been acquainted with the discoveries made in the New York school. Their papers recognize only the former views of dental anatomy, consequently they entirely ignore the possibility of any vital reaction or inflammation on the part of the bioplasson, excepting that Dr. Miller does admit that the same vital force which produced the chemical combination of the lime-salts with the organic matter can and, as it seems, does under certain conditions of ill-health dissolve it again; that is, while no irritation of ferments, or of the taking away of lime-salts, can affect the living matter, ill-health can make the vital force reduce the chemical combination of lime-salts with organic matter to a simple mixture more easily soluble for acids. All this belongs to a former period.

I have tried to avoid any allusion to the earnest endeavors of Dr. Miller to explain the phenomena of caries on the theory that the organisms only run an acid factory and the acids destroy the teeth. But the immense importance which has been conceded to his work and, as it seems to me, the overestimation of its scientific value, so impresses me that I must notice a few of its inconsistencies. I will gladly concede all merited honor to an American scientist, and regret that I cannot agree with the *Independent Practitioner* in placing Dr. Miller at the head of the list of recent scientific discoverers. In studying Dr. Miller's papers I claim only the right of a juror to pass judgment upon expert testimony. The question in dispute between Underwood and Milles and Dr. Miller refers only to the methods by

which bacteria produce caries—the former claiming as a matter of *opinion merely* that they do so by an acid which they create by feeding upon the living fibrils—the latter claiming to have *proved* that they produce the acid by feeding on food substance found in and upon the teeth.

Dr. Miller lays down this rule for the observance of invesigators, viz: "It is not enough to guess the cause, or guess at it; we must *find* the *cause* and, having found it, *prove* that it is the one sought for." I will notice some of his assertions.

He says: "There are at least a score of acids possessing the power of extracting the lime-salts from the tooth in a high degree to be met with in the oral cavity under varying conditions. Consequently until some one by facts establishes a better theory we must look upon the theory of decalcification by acids as the accepted theory." This is proof number one.

Again: "There is no difficulty in accounting for the source of the acids concerned in the caries of the teeth. The saliva is impregnated with acids, ... but by far the greater part in the decalcification is to be attributed to those acids which are produced in the mouth by fermentation."

Experiment: "Pieces of sound dentine placed in a mixture of saliva, bread, meat and sugar, became in ten days decalcified to the depth of half a millimeter. Numerous experiments of this nature showed a constant and powerful generation of acids. The conditions present in the experiment may always be found in the human mouth. (Not proved.) Portions of food remain lodged between the teeth, or in fissures and depressions in the teeth themselves, or in the cavities of decay, and lead to the production of acids sufficiently strong to at once attack the teeth." What an assertion is the following: "These conditions may always be found in the mouth." No constant change by the alkaline secretions, by masticating and drinking. No constant flow of saliva, but the mouth a closed vessel, like a corked bottle in the laboratory for ten days. What a wonder the teeth do not all disappear the first month after their eruption. Nature certainly made a great mistake in making such teeth for such a mouth. Such is proof number two.

Again: "Have bacteria the power either to penetrate or decalcify sound dentine?" Answer: "In not a single instance have I found them to pass beyond the softened dentine into the sound dentine." Therefore they cannot penetrate the sound dentine. Under-

wood and Milles say they have so found them, but their investigations are of no account. They are only novices—have been only *seven years* investigating, while I have been nearly *three years*, besides doing a large dental practice. Besides, the dental canaliculi are only $\frac{1}{4300}$ of an inch in diameter, while an average bacterium is $\frac{1}{23000}$ of an inch, and some are even less than half this size. The largest are $\frac{1}{10000}$ in diameter; therefore, being from one-half to one-tenth the size of the canaliculi, they have not the power either to enter or decalcify sound dentine. And, again, the canaliculi being filled with protoplasm and living matter, the bacteria would have nothing to live upon themselves or to give their rapidly increasing family.

Again: "We may look upon caries of the teeth as consisting of three stages (1) decalcification," so that the bacteria can enter the tubuli, being one-fifth its diameter; (2) "infection and devitalization of the decalcified dentine," for of course they could not infect and devitalize the living matter until the lime-salts are removed so that they can gain entrance. "By decalcification I mean only the breaking up of the bond of union," and leaving a mixed up ruin. The bacteria could find their way so much easier into a trackless mass than through a well-organized structure, with open passways and nothing to hinder, but plenty of food. And, again: "I have adhered to the (old) acid theory of decalcification in this article, not because I regard it in any way competent to account for all the facts, but because it comes nearer to accounting for them than any theory yet proposed." *Quod erat demonstrandum.*

As a juror, I am not surprised that the judge decides the evidence to be incompetent and that there is no case before the court.

In Dr. Miller's final summing up of what he has done, I find the following:

"I proved at the same time that the invasion of the micro-organisms was not in the majority of cases simultaneous with the softening of dentine, but that large areas of softened dentine could be found that contained no fungi. Of all those who examined my preparations in America, no one, whatever his theory, ever denied this fact. I conclude from this that the softening of the dentine went in advance of the invasion of the organisms."

The passing around of specimens from city to city, to be examined by men of no special attainments as microscopists, under instruments good, bad and medium, and then concluding, because no one ever once denied his claim, "that the softening of the dentine went in

advance of the invasion," is the weakest kind of negative evidence. I happened to be present with several others, two of them good microscopists, when some of those slides were under examination. The unanimous decision was that with the instrument in use, which was called a good one, no judgment could be formed.

It is unfortunate for Dr. Miller that he has to depend so largely upon negative testimony. He also takes too many things for granted: For instance, that he understands the true anatomy of the teeth; that he knows that there can be reaction of the vital structure; that the organisms can produce no other substance which can "destroy the equilibrium;" that the organisms cannot act as a "true ferment in abstracting oxygen from the tissue, when deprived of air," (Pasteur) etc., as testified to by the authors I have quoted. Also that he has produced the conditions found in the living mouth sufficiently similar to give reliable evidence to the results he has obtained. Having admitted the necessity of organisms and bread and butter for the production of acids, he ignores any further need of physiological processes of vital chemistry in breaking up the "bond of union." In other words, caries is a chemical injury, not a disease. He squarely presents this issue, the outcome of which will be watched with interest. The position is strongly suggestive of the story of the bull and the locomotive.

In the language of Zeigler, "When we can define a disease, not according to its symptoms or its morbid anatomy but strictly by referring it to its causes, we shall gain far more than a comprehension of the affection; we shall have done much to settle the therapeutic treatment."

Dr. Miller is to be congratulated that, acting in accordance with this statement, he has been seeking agents destructive to organisms, thus admitting the truth of the germ theory of dental caries.

I will close this brief notice of the papers of Dr. Miller with a fitting paragraph from Gradle:

"If we were to drop our acquired medical notions, and were to approach the study of disease from the standpoint of the modern naturalist, the germ theory would present itself in a more attractive light. Throughout nature every species of living beings struggles for its existence with all other beings with which it comes in immediate contact. In numerous instances this struggle amounts to the preying of a smaller species upon the body of larger creatures, the former deriving from the organism of their host their means of subsistence."

There is little to be said about the gross chemical theory of caries, so long accepted under protest. That the explanation it gives has been and is entirely unsatisfactory, is proved by the discussions which for many years have been going on, and the many attempts to find a better theory. Not until the investigations of Underwood and Milles were published was much progress made in solving the difficult problem. Dr. Miller has added hardly anything to their discoveries. Even if all he claims in regard to what organisms *do not do* shall eventually prove correct, it would still remain, as Underwood and Milles stated in 1881, that not only caries but suppuration of the pulp and alveolar abscess also depend upon *the successful working of organisms, and that the exclusion of germs* by the use of powerful antiseptics would prevent the *disease*.

Those who still seek an explanation in the gross acid theory, are referred to a series of articles in the *Journal of the British Dental Association*, by Henry Sewill, Mr. R. C. S. and L. D. S., Eng. Only those of May and June have come to hand. These are full of old beliefs and opinions, based on former views of histology, and a rich spicing of sneers and ridicule aimed at those who believe in the vital reaction of the living matter in dentine. Thus far they contain nothing special in the line of new evidenee.

In regard to the ability of the dentinal fibrils—or the bioplasson of Elsberg—to take on inflammatory action, it is sufficient to refer to the evidence seen in the effects of thermal changes following the introduction of a metallic filling, often continuing for months, and resulting in the death of the pulp; to the effects of drugs, such as chloride of zinc, alcohol, and other irritants, in producing their characteristic sensations; and especially in the effects of arsenic, when applied to *sensitive dentine*—a term long in use. The effect of this agent in causing inflammation and death of the pulp, when applied to the periphery of dentine, is well known. Dr. Bödecker, in the *Dental Cosmos*, Vol. 25, page 505, has shown the inflammatory condition of the fibrils after the application of arsenic. Why, then, should it be doubted that the irritation produced by parasites feeding upon the fibrils should also set up inflammatory action? That this point will eventually be conceded by those who now ridicule, excepting some like the author of a recent book written to prove that the earth is flat, is as certain as that they are capable of intellectual progress.

At my request, Prof. Mayr has kindly permitted me to present his views of dental caries, given more fully than have been published elsewhere. His many friends will be interested in their perusal.

"The development and progress of caries appear to me at present, considerably modified by suggestions from dental friends, studies and discussions, from their first somewhat foggy shape, to go on in the following order:

First. A congenital defect in the enamel, not only a pit, a fissure, but within this pit or fissure an abnormal, imperfect foundation of enamel and enamel fibrils.

Second. The remaining of a particle of food in this pit.

Third. The presence of all kinds of germs in the mouth and their consequent immediate invasion of this remaining particle of food.

Fourth. The lively fermentation of this particle of food, laying bare by the resulting acids a certain amount of live matter in the enamel.

Fifth. The final death, from lack of proper circulation, of this weak live matter, and thereby irreparable loss of territory.

Sixth. The continuing process in this manner of killing the abnormal weak live matter, its consumption by the germs, etc., in the enamel, very often only within a few weak canaliculi, until the dentine is reached.

Seventh. The spread of the germs in the interzonal spaces by the withdrawal of nutriment from the fibrils of the bioplasson in them, hence starvation and death of the fibrils. They are then appropriated by the germs, at the same time food from without and within undergoing fermentation, as a secondary and remote process acid formation is going on, which dissolves lime-salts; the dead but not yet fermented zone is the intermediate zone.

Eighth. Entrance into those dental canaliculi which do not contain strong filaments, absorption of their pabulum by the germs, thereby death of the filaments, which are afterwards consumed by the germs; by the advance of the process in the weaker fibrillæ, also the stronger ones become finally weakened and a prey to the enemy; afterwards secondary solution of the lime-salts, etc.

Ninth. The interruption of the proper circulation in the destroyed canaliculi, absorption of pabulum by the germs, and death of parts of dentinal fibrils, causes the remoter parts to react, hence inflammatory processes in the more remote regions, throwing up of walls of lime-salts to keep the enemy out, pain to cause the patient to seek aid, etc.

Tenth. If not checked, the inflammation in the pulp reaches a stage where it becomes choked in its own stagnant circulation, death of the pulp, advance of the germs within the pulp cavity, but no

dissolving of the tooth without saccharine food, because these germs cannot live on meat alone, at least they do n't produce lime dissolving acids.

Eleventh. The tooth is not dead as long as cementum and pericementum are still alive; the enamel remains alive with exception of the invaded spot.

Twelfth. The carious, soft, decalcified old plug in a cavity teaches nothing whatever; it is the decayed corpse killed by a disease which has long ago run its course and which is active on the boundary between the healthy and the friable dentine; this plug is entirely a secondary product which has not as much connection with the process as the scab on a sore has with the sore."

In conclusion, I congratulate the dental profession on what has been done in this line of research during the last seven years. If I were to name the essential agencies more immediately connected with this good work, the names of Underwood and Milles and Prof. Heitzmann and his New York school, would stand foremost, never forgetting the great preparatory work of Pasteur and Lister.

TRANSLATIONS.

TO THE PRESIDENTS OF THE DENTAL COLLEGES IN THE UNITED STATES OF AMERICA.

Gentlemen: From the *Dental Cosmos*, 1884, on page 247, I see that a meeting of the representatives of all dental colleges is called for August 4, to New York, which has for its aim deliberations about uniform rules for graduating candidates.

The warm interest which I have always taken in dental colleges prompts me, gentlemen, to address these lines to you, and to call attention to abuses, the removal of which I request in a civil as well as urgent manner. The meeting previously mentioned seems particularly fitted to foster the object of my certainly not unfounded request and to procure the much-needed quick remedy.

I have before me an article of the *Independent Practitioner*, 1884, page 241, which comes from the pen of an American by birth, Mr. J. L. Tierney, D. D. S. In this article the same abuses were spoken of with the greatest objectiveness, which are the cause of my remarks. Complaint is made in it that the dental colleges graduate persons

from foreign countries (especially Germans), who do not possess the least scientific preparation, and who, without even being master of the English language, have belonged to the college only four or five months. The consequence of this is, that people who are here in Germany in the most lowly positions, as "barbers, chiropodists, dental office cleaners," etc., after a short stay in the Union, return as "D. D. S."

These statements of your fellow-countryman I can only, unfortunately, corroborate. I take the liberty to mention, from the numerous familiar examples of the more recent time, only one: A barber of this city, last year, in September, who was formerly servant in a dental establishment, went to the United States of America and entered a dental college much frequented by Germans. From November until February he heard the lectures in the English language, and—graduated as D. D. S. The man can scarcely read English words, much less follow an English lecture! Such people practice in the German Empire, already in great number, as "American Doctors of Dental Surgery," graduated from legal colleges. At a German university these people would never be admitted as hearers, much less as students fit to take part at State examinations, because it is generally thought that no one can enter successfully a special study after such deficient preparation. How is it possible that these people, who scarcely master their mother tongue, at American dental colleges, after a four to five months' course of lectures, in the English language, are able to pass the examinations successfully for D. D. S? How is it possible that these foreigners, in such a short time, appropriate to themselves those acquirements and faculties which the American by birth can obtain only after two years' study? I must agree indeed with Mr. Tierney when he says, in the article mentioned, that these "five month doctors," although not in form, at least in quality, have to be considered as standing on the same level with those who have their diplomas from a Buchanan or Wisconsin college. It cannot be wondered at, gentlemen, that dentists, licensed in Germany, cannot consider those uneducated persons who graduate in your country as colleagues. But what opinion must the German public form of American dental colleges, when it sees those people who, five months before have been barbers, return as "Doctors of Dental Surgery?" It is to be regretted that, under these circumstances, the innocent must suffer with the guilty; and we have here in Europe, among "American dentists," many who are well qualified.

In the whole world, and not the least in my own country, the high merits which the United States of North America have acquired, in the development of dentistry, are always acknowledged. Your dental colleges were esteemed for a long time as the high school for dentists, and one could justly say that that dentist who, coming from a university in his own country, had attended an American college for his perfection, had done the most, possibly, he could do for his education. For that reason many Germans, who had already acquired an excellent home training, went formerly to the Union to perfect their acquirements at a dental college. To-day it is different. To-day it is for the greater part entirely uneducated people who, in the most favorable cases have been employed as dental servants, who are attracted to the American dental colleges—a few with the intention to learn, many more with that of acquiring the diplomas as D. D. S. in the shortest time possible. On this account, the former good name of your dental colleges has suffered severely, and will suffer still more in the future, if a remedy is not very soon procured.

The educated German dentists who would be ready to expand their knowledge at your dental colleges are deterred from going there; for you see, with what people they must associate in the college, and what incapable persons they must afterwards consider as "colleagues."

I believe, gentlemen and colleagues, to have sketched to you the outlines of a true picture of the circumstances which have already damaged the formerly good name of your dental colleges, and threaten to destroy it in future. The interest which I have always taken in the American dental colleges, and which I may suppose as well known to you, gentlemen, may excuse my requesting you to turn your attention to those abuses described by Mr. Tierney and by me, and to remove them as soon as possible. Take care, therefore, gentlemen, that in future only really capable persons are graduated from your dental colleges; that to all those foreigners who have not obtained a license in their own country, or at least have not attended a university a sufficient length of time, the title of a D. D. S. be given only after a course of several years, and after they have given an actual proof of their capacity by a thorough examination! Only by the severest application of these principles at the examination for graduation, can your dental colleges again obtain the former reputation with us in Germany.

With great respect,

DR. ADOLF PETERMANN.

Frankfurt-on-the-Main, May 21, 1884.

Reprint from the Monatsschrift fur Zahnheilkunde.—M. BARDWELL.

SUBSTITUTES FOR LOST JAWS.

BY DR. W. KAY, OF BERLIN.

[Translated from the Zahntechnische Reform, March, 1884.]

Continued from page 227 of the Journal for June, 1884.

The cavity in the substitute may be secured in a different manner than by inserting cotton wool. I have found it mentioned that the interior may be filled with small pieces of zinc, which can be eaten away by muriatic acid. I think, however, there would be danger that these pieces of zinc might penetrate through the caoutchouc walls and as an equal thickness of the latter cannot be obtained and the rubber would thus mix with the zinc pieces, the mass would be unnecessarily heavy. A very commendable method is to use sand. We form first, of cotton wool, a suitable pad, according to the shape of the cavity, and sew it in a linen bag, but so that a little space is left open to allow for the removal of the cotton wool. After removing the wool we fill the sack with very fine dry sand, and the aperture is sewed up. We now proceed in general as we should had the cotton wool been used instead of sand. After vulcanizing, before finishing, we bore a small hole in the piece and beat it with an instrument until all the sand has run out. We then cut a small joint in the hole, file a suitable cylinder out of vulcanite, heat it a little and turn it into the hole; it will then fit into the joint and be perfectly secure. We now cut the remaining end away and finish neatly. Should the upper jaw have no natural teeth, we must of course provide for the retention of the substitute by springs. I had such a case which was, however, favorable, inasmuch as on the lower jaw there were only four incisors. If all the teeth of the lower jaw are present, so as to embarrass the application of springs, then we must place a bow bridge along their inner side, which must be suitably attached to a piece on the outer side where the springs can be fastened. In rare cases, when the teeth are poor, we will have to decide to make room for the under portion by extracting. In cases where the remaining portion of the upper jaw has become toothless, it is much easier to get an impression, for the impediment caused by existing teeth is removed, and we can more easily carry up the impression cup. We next make pattern plates, from the models for the bite. In the case of the lower jaw, we fill up the spaces where teeth are wanting with wax (which must well harden) to the height of the teeth. The pattern for the upper piece is made of gutta-percha, strengthened by inserting wire, and the alveolar rim is made of wax as high as we think it should be car-

ried. We cannot insert these patterns for taking the bite with springs, as the contraction of the mouth causes difficulties, and the patterns might be easily brought out of shape. We therefore hold the proof-plate for the upper jaw, with an instrument or the fingers, in its place, so that it fits tightly, and then take the bite. It is necessary to mark correctly on the wax the length which the teeth are to have. As a rule, they must be very short, as the mouth at first can be but slightly opened, and yet there must be room enough to allow the passing of a tea-spoon between the teeth while eating. We therefore remove wax from the alveolar rim till the right proportion has been attained, and of this we can judge best by causing the mouth to be opened as far as possible, and taking into consideration the space between both wax surfaces. It is possible that by thus practically proceeding, æsthetic laws are duly regarded, but the former are here of greater importance. The plates are now put into the articulator, packed, and fitted without springs by holding the upper portion again with the fingers in its place, and letting both bite together. If the bite is satisfactory, the pieces are again put into the articulator, and the springs adjusted. On the non-resected side, this is accomplished without difficulty; the resected side, however, requires great care. First, the buccal protector on this side is modelled out of wax. The spring clasp must also work very accurately on this side; it must not act against the teeth or the buccal protector; it must also be enclosed by the buccal protector. The clasp supporters mnst be vulcanized and not screwed in. After the clasps are regulated, I take from the supporters and plaster the piece, but take the precaution to brush over with thin liquified plaster the head of that supporter which lies under the buccal protector, so that this fills out the space between part and joint, otherwise rubber might be pressed between and be difficult of removal on account of the impeding buccal protector. The plastering and packing the forming of the mass, etc., is done in the manner already described, only the opening of the flask is more simple, as the model has no teeth and there are no clasps.

P. S. The first part of the foregoing article has been reproduced in several foreign journals. *L'Odontologie* remarks, in its February number, in addition to the translation, as follows: "Coles and Kingsley have gone still further in the perfection of impression-taking; it is often necessary to apply moulds in these difficult cases, and sometimes we cannot obtain an exact or even satisfactory impression without them. A primary impression serves for the making of an impression

cup for the special case out of rubber, lead or gutta-percha. Coles has made one consisting of two halves; first the impression is taken on one half and then in the other. Either this method, or any other where manipulating in halves can, as the case requires, be applied, but it is evident that our German colleague cannot obtain models of sufficient exactness with the rather simple methods he recommends."

This criticism of our Parisian colleague was written before they had read the continuation of my article in the February number. The enumerated methods of the moulded impression cup for special cases are just as well known to me as Coles' perforated claw-like cup for defects of palate. I am, however, of the opinion that those simple methods which I recommend will yield more satisfactory results if, as I have stated, irregularities of the impression are corrected in the proof-plate. I am further of the opinion that even with the special impression cup, an exact impression cannot be obtained; it will, as regards the resected side, only be approximately correct, on account of the difficulties I have already cited, and it will always be the duty of the artist to construct the substitute on this side partly according to his judgment, and to let it be worn to see if it answers its purpose in every direction. I also think that the special cup, made after the whole surface of the first impression, by halves, would cause more difficulty in its insertion than the simple modified cup I recommend. We cannot, even with the special cup, obtain the entire height of the defect, but this is not necessary. I have obtained entirely satisfactory results with my simple methods; for the four cases I made are all worn with comfort, and the simplicity of a method is certainly no fault.

DISINFECTION BY HEAT.

BY DR. H. BUCHNER.

[Translated from the Ærztliches Intelligenzblatt.]

Concluded from page 179.

In this report, the scientific basis has been acquired partly through experiments made by the Imperial Board of Health, and partly through experiments of my own, which conjointly prove that great heat (above 140° c.) is necessary in dry heating for disinfection, but that with the aid of water vapor, of the temperature of 100° c., working for some hours, it is quite sufficient to kill the spores of spleen gangrene, which may be considered the most resisting patho-

genic micro-organisms. These experiments were made in Berlin, in 1873, at the city barracks, where a suitable apparatus was put up and made use of. A second considerably improved apparatus was constructed there in 1879, and used. An accurate model of the latter was found in the Exposition, the construction of which is as follows: In a room supplied with a double wall, and isolated, between which strong copper vapor pipes are placed spirally in the inner wall and floor, into which vapor is conducted from outside; a second narrower pipe lying on the floor, with holes made in its lower part, serves for direct absorption of vapor. The ceiling of this chamber is pierced by a drain-chimney covered with a helmet adjusted so that the chimney can be opened or closed. A few short pieces of pipe, not much above the floor of the chamber serve, when opened, to introduce fresh air. In the outer wall of the chamber there is an opening supplied with a double iron door, which serves as a means of entrance for the objects which are put into lateral benches. The interior serviceable space contains 11.8 cbm. For disinfection, we first heat the large copper spirals with vapor till the temperature in the chamber has risen to about 110° c.; then follows the letting in of vapor through the smaller pipes, during which time the copper spiral is still being heated. Now, the letting in of the vapor is interrupted while the large spiral still heats on, and the chimney helmet is opened to let in ventilation. The art of applying dry and moist heating is due to H. Merke, director of the barracks. The great advantage hereby gained is that the vapors do not touch cold objects, and thus avoid settling on them and totally wetting them. The objects being already hot, when the vapor enters, the condensing of water vapor is very slight and the vapor can therefore act upon large objects much more easily, such as a mattrass or blanket. At the same time, another advantage is obtained, viz: that of preventing the clothes being injured. With simple application of vapors yellow stains ensue. By the ventilation alluded to, with the continuous heating, we find that the articles in the chamber are perfectly dried, so that when the chamber is opened they are taken out dry. With this apparatus, the principal thing was the control of temperature in the large objects disinfected. Even should the temperature in the chamber reach a certain high grade, such as 110° c., it is not likely that the interior of a parcel of blankets would have an equal temperature. Generally, the temperature of these objects is (if the heating does not last too long) less than that of the chamber. As a guide in these matters,

Merke has made several experiments with maximum thermometers, which show that the imparting of temperature, even with very large articles, is quite sufficient to give through the ordinary process a heat of 100° c., and which, with the aid of vapor, is enough to kill all pathogenic fungi. On the same principle, and after Merke's direction, a transportable disinfecting apparatus has been constructed, and one was at the Exposition. It deserves special interest, for we can, when in danger of epidemics, have recourse to this apparatus in all cases where chemical disinfection is impossible.

EDITORIAL.

CRITICISMS.

The *Cosmos* of June, 1884, contained a report of a meeting of the New York Odontological Society, and in this report a paper by Prof. Charles Mayr is given. His definition of disinfectants and antiseptics rests upon *his* conception of what putrefaction means, and to accept one term one has to accept the other. He makes a praiseworthy effort to give to words a clear and precise meaning, and in his zeal he may also make mistakes; but the principle is good.

The theory that oil of turpentine acts by its oxygen-carrying power, as pronounced by Prof. Mayr, would seem to need some support. Why does he ascribe to this substance such a peculiar action? Is it because of the fact, discovered long ago, that turpentine absorbs oxygen with great speed and converts a considerable amount of it into ozone, which has been found very destructive to germs? Perhaps this is the way he wishes us to have the oxygen-carrying power of turpentine understood.

We recognize in his arsenic theory a favorite idea of the professor, but a better one than many others we have seen.

On page 346 the professor says: "Pour mercury into water and it remains odorless." What did he mean by that? To pour metallic mercury into the water, and the mercury or water would remain odorless? The connection seems to show that he must have meant to pour a solution of bichloride of mercury into water. Another passage makes him say "hydrosybenzol;" it ought to read "hydroxybenzol;" the same also, instead of "hydrosyl," "hydroxyl."

The discussion which followed the paper of Prof. Mayr seems to have been rather extensive. We agree with him in what he says about poisons; it is as relative a term as food; anything may be a poison or a food; that depends on circumstances.

Dr. Atkinson made some summing up remarks. He "enters a caveat against men coming to conclusions without being able to justify them." Words alone will not justify conclusions; that we know well. He spoke in a general way, and we hope he will not feel how painfully this applies to himself. Dr. Atkinson might have ascertained by the simplest kind of experiments, as we have done, what gas escapes, if an abscess is treated with peroxide of hydrogen, and he would not have need to come to conclusions "without justifying them." It is nothing but oxygen with a very little amount of carbonic acid, so little that every one making the experiment will be astonished. Dr. Atkinson is correct in considering the peroxide of hydrogen a peculiar compound—H_2O_2; this is no doubt correct, but let him only try the experiment, and he will find that no "*hydrogen*" escapes; nothing but oxygen. How hydrogen could escape appears to us so unexplainable that we suppose a misreading of the stenographer who, by his phoneticism, wrote ntrg or htrg without distinguishing sufficiently between his n or h. Nitrogen would have a show of justification, if an albuminous compound, say of the type CH_2NO in varying proportions, as the albuminoids all have, would be burned up by the oxygen of the peroxide of hydrogen. We would have, expressed in a very crude and supposititious diagrammatic way,

$$C+O_2=CO_2$$
$$H_2+O=H_2O$$

N does not combine with O

O escapes with the other O.

Hence, the product would be a mixture of carbonic acid vapor, water vapor, free nitrogen, free oxygen, but no free hydrogen. We do not doubt that in this case we merely are fighting a straw-man, set up by the stenographer, and not Dr. Atkinson's own utterance.

The fact of oxygen escaping needs no theoretical foundation; it stands as such; but the process is very difficult to explain, and the whole development of oxygen in this case resembles more an explosion than anything else. The first start of decomposition given to it, either by heat, or by organic substances, or by silver dust, or platinum, and the whole amount of H_2O_2 decomposes, freeing half the oxygen in its mass; a small quantity escapes as ozone, and this is the

active part when we use it in teeth; the oxygen, as such, is inert. What Dr. Atkinson said about listerine is very correct, and if Prof. Mayr referred to the preparation with its patent medicine name in any other than a merely scientific manner, he deserved to be downed. Dr. Atkinson has a remarkable gift of saying pleasant things in a pleasant and not at all odious way.

Dr. Bogue recommends the hot air as a very good antiseptic, and we do not doubt that he is correct, only it would seem difficult to go deep enough without considerable inconvenience to the patient. He also thinks that the processes in a dead tooth are exceedingly different from those in live teeth. At least, as long as both are in the mouth, we cannot agree with him in that. A dead tooth in the mouth never is completely dead until it has turned all black and crumbled, and probably a really dead tooth will not remain in the mouth many weeks; a certain amount of life will be even in the "dead tooth," and the same vital processes which go on in the living tooth will go on in the dead, only with less intensity; but, most of all, we do not believe that the enamel dies with the pulp, and in cases of successful replantation we believe that there is success only, when a living connection between enamel and periost has been established; that then at least the enamel and, by the many ramifications, also the other parts of the tooth receive a moderate amount of living impulses. Thus, whatever is said about living teeth, holds good, only in a smaller degree, also of dead ones in the mouth; the tooth is only dead when it is taken out of the mouth, and only then would we not be allowed to talk of it in the same manner as we do of the live teeth.

In the meeting of the First District Dental Society, of November 6, 1883, which, somewhat late, is published in June, 1884, Dr. Odell spoke very highly of the "mechanical mallet" of Dr. Bonwill. All those who had experience with it recommended it very much as being almost alike in its action to the electrical mallet, but much softer.

The rubber dam question occupied a large part of the session, but was very interesting and worth reading.

Dr. La Roche submitted affidavits which showed that in 1857 he applied the dam. None who invented it after that period need any more apply for recognition as to the priority. But in many such and similar simple things — eggs of Columbus* — many independent inventors, without knowing of each others' inventions, invented the

*By the way, his name was as little Columbus as that of Jones would be Jonius. His name was Colombo.

same thing at about the same time; thus, as an instance, we have the ship-screw, invented in every country "first"; an Austrian, a Frenchman, an Englishman, of course an American—all have first invented the ship-screw, and so with very many minor things, even the telephone or the phonograph not excepted.

Dr. Jarvis seems to us to somewhat pronounce a correct judgment about the inventor who keeps something to himself and afterwards complains that somebody else, who also invented it, published the thing, and himself as its inventor. There seems to us to be just retribution for selfishness of one man and for liberality of another; the selfish man does not deserve, besides the miserly gratification of his selfishness, to have the popular award of the inventor; to get that award one has unfailingly to publish a new thing and give the benefit to his neighbor.

In a clinic, platinized gold was used for fillings and was said to give excellent results.

Dr. H. E. Dennett brings forward the old, often exploded theory that the Indians have only decayed teeth since their civilization, or contact with civilized people.

Dr. Barrett, we think, has already cured the dental world, at least as far as the Indians are concerned, of this superstition. The *Cosmos*, with a fine sarcasm, immediately afterward prints a report about the weakness of the teeth of the old Etrurians, and finds them as bad as those of the present days; and yet that was 3,000 years ago, Dr. Dennett.

The *Progres Dentaire* intends to give to its readers the full benefit of translated extracts, so that they have not to buy the books. It has already printed for a year or so the translation of the book of Coleman about Dental Surgery and Pathology, and now prints also that funny little book of Quiz-Questions, by Dr. Foulks. These questions read just as funny in French as they do in English. There are some atrociously stupid ones in that book. We retranslate from the French.

Question: At what periods of life has the age any influence in the treatment of the pulp?

The most astounding, deep and never-thought-of answer reads—yes, friends, it really reads thus in print:

Answer: In youth, middle age and old age!

Pray, Doctor, why did you not follow up the deep wisdom by the next question, which ought to have followed:

Question: At what periods of life has the age no influence?

Answer: At the remaining (the embryonal and the corpse age).

Friends in dentistry! do not fail to read the funny book. Every single question includes heaps of involuntary fun, and is worth a show or Mulligan's picnic.

We do not doubt that the French journal, with the keen sense for everything funny which is particular to the Frenchmen, translates this marvelous book of printed commonplace and pinafore science for the merriment of its readers. This number does not shine by originality; of its 32 pages of reading matter, only nine are original. Three pages of these contain a report of a society, three pages an article of Dr. Peyraud about the "dosimetric" method of giving chloroform; three-quarters of a page are given to a list of the journals received, and the remainder is a correction of misprints in the foregoing number; 23 pages are translations from the English and German. This is probably very exceptional; for the French have always stood foremost for originality.

El Progreso Dental, of La Habana, April, 1884, seems considerably superior to its French brother. It contains original articles, a lecture of Prof. Poey from the dental college in Habana.*

In an article about cauterization of the pulp, Dr. Redier, whose article is published, says: "The arsenious acid is the caustic par excellence for the dental pulp. Thanks to its insolubility in alcohol and saliva (?) one may be sure that its action can be rigorously localized upon those points with which one has brought it into contact, a fact which permits to avoid accidents of periostitis, which may be observed frequently after use of liquid or soluble caustics, chiefly the chloride of zinc, which is nevertheless employed by many practitioners." What do our American brethren say about this pious confidence of Dr. Redier in his arsenic? We have heard just the opposite; in this, Dr. Redier stands about 1840.

A patriot gets warmed up because Dr. Ottofy, in the *Missouri Dental Journal*, ascribed to Spain and Cuba two dental journals, while there are four. The whole journal is worth reading.

ERRATUM.—On page 287 the ninth line should read, "there can be *no* reaction of the vital structure," etc.

*Often misprinted as Havana.

The latest craze in regard to mercurial poisoning is that it is caused by the *mirrors*. Now this is unfortunate, for the world *could* get along without amalgam fillings and rubber plates somehow, but *mirrors!* oh, horrors! never.

The body of a good brave man, Dr. Gross, was cremated at Washington, Pa. He died May 6, 1884, in his 79th year, being almost all his life connected with the teaching of medicine.

The Maryland Dental College has suffered a great loss in the death —April 3d—of Dr. Keech, born January 25, 1831.

SELECTIONS.

Specialism in the practice of medicine has its justification in the enormous field and abundant fruitfulness of modern research, together with the special skill required in the use of instruments and apparatus in certain of its departments. And, whilst the technicalities of dental manipulative and operative surgery as much demand its separation as do those of opthalmic surgery, it is satisfactory to note that the teeth, like the eye, furnish a good field for exact and thorough observation and treatment. The application, already to a high degree made, to the various morbid conditions of the teeth, of scientific methods of investigation and treatment, cannot but have a beneficial influence, not only on dentistry, but also on general surgery. The exactitude which is attainable, in consequence of the accessible position of the teeth, whether in observation, in experiment, in diagnosis, or in treatment, must furnish an example of great value to those concerned with the more obscure organs and conditions of the body. The specialist, on the other hand, be he dentist or oculist, can ill afford to ignore the general methods of investigation, of reasoning and of treatment, employed by the general surgeon and physician, whose loss by lack of concentration is, perhaps, more than compensated for by his gain in breadth of view. Nevertheless, lack of concentration is a real loss. The very limitation of the area of activity enables a man to dig deeper into the mine of knowledge, and to cultivate to a higher perfection the field of practical skill. When reading or observing the best results of specialism, one feels sometimes tempted to follow

such brilliant examples of thoroughness in some one department to the exclusion of general practice, but the first difficulty is that one would not know which specialty to choose, since each is so full of interest!

Specialism in study needs no apology: it is only specialism in practice that has to be defended on the ground of the practical exigencies of the case. A man engaged in the general practice of medicine or of surgery, or of both, may well make a special study of whatever class of cases he may have good opportunities for observing, or in which he may feel a particular interest. Only let him remember that whilst pursuing his hobby he is in honor bound in no wise to neglect whatever else he professes to understand. Still more is it necessary for the practitioner of any specialty that he should cultivate a wide, even if somewhat superficial, acquaintance with various kindred departments of science and practice. Otherwise he is in danger of becoming narrow-minded and even conceited (which would be highly detrimental to his own well-being), as well as overlooking important side-issues and general indications (which might be highly disastrous to his patients).

The best practical remedy, or rather preventive, for such a tendency is direct communication with men who are practising in other departments, both special and general; and one of the most important methods by which such communication may be attained, not only with the men themselves, but with their practice, is by having, at every general hospital (which ought always to be a center for professional activity) a special department in each of the recognized branches of practice. Such departments are superior, as a rule, to special hospitals, not only in economizing time and labor and expense on the part of the public (both benefactors and benefited), but also in promoting and facilitating that interchange of experience and widening of interest which tend so much to advance the best interests of the profession and the public. Another method of still wider applicability, and one which already has borne good fruit and deserves to be fostered, is by members of a scientific society uniting occasionally with those of some other society, more or less closely related in its objects, for the discussion of matters of interest to both. Such friendly scientific intercourse can scarcely fail to be useful and pleasant to both the parties concerned.—R. J. Pye-Smith, F. R. C. S. *Dental Record*, July, 1884.

BOOKS AND PAMPHLETS.

FERMENTATION IN THE HUMAN MOUTH, etc. By Dr. W. D. Miller, Berlin.

From the *Independent Practitioner* a reprint has been made of Dr. Miller's papers about Fermentation in the Human Mouth. The little book forms a most excellect monograph about this important question. It might almost be an insult to speak to any dentist about the standing of Dr. Miller. He arrived in this country June 21, and we do not doubt that his American brethren were delighted to see the gentleman who has done so much to clear up the fog surrounding cavities of decaying teeth.

ON EMBRYOLOGY, with Special Reference to the Development of the Teeth and Contiguous Parts. By J. L. Williams, D. D. S.

Dr. J. L. Williams, of New Haven, Conn., not only a genial dentist but also a highly educated investigator, has published as a reprint from the *Dental Cosmos* , his paper on Embryology, as read at Providence, October 4, 1883, with two very fine colored plates. Part of it is a synopsis of the important embryological investigations made since 1850, but much of it is original. Dr. Williams describes in detail the process through which he went to prove the odontoblasts to be ganglionic elements ; and the dental fibrillæ to be prolongations of the odontoblasts. The nerve fibers, which ramify everywhere near the surface of the pulp, can be seen with his famous immersion objective to send terminal fibrillæ into the reticulum with which the roots of the odontoblasts are in immediate connection. Dr. Williams seems to be a man fit in every respect to carry still further the beautiful investigations of Drs. Heitzmann and Bödecker. We do not doubt that Dr. Williams would send at self-cost to any one wishing it the interesting little pamphlet. Every dentist who wishes to be abreast with the progressive men in his science ought not to fail to have an extensive collection of similar monographs.

A NEW METHOD OF TOOTH DRAWING.

A small square of India rubber, pierced with a central hole, is pushed over the tooth until the upper part of the root is reached. The rubber gradually contracts, pulls on the root, and the tooth is finally enucleated without causing any pain. Four or five days complete the operation, while very slight bleeding and slight swelling of the gum are the only inconveniences. This procedure is recommended by a dentist of Geneva.—*Med. and Surg. Reporter.*